

**CENTRE D'ETUDES NUCLÉAIRES DE
BORDEAUX-GRADIGNAN**

Vendredi 14 Octobre 2016

à 11H

Un café sera servi à partir de 10h45

Guillaume HUPIN

CEA-DAM Arpajon

**Unified Ab Initio Approaches to Nuclear Structure and
Reactions of Light Nuclei**

Advances in the fundamental description of the interaction among nucleons, in many-body techniques and in scientific computing have opened new avenues for the modeling of low-energy light-ion structure and reactions on an equal footing. Starting from chiral effective interactions, which provide a systematic and improvable scheme based on the underlying theory of QCD and, applied with an ab initio method, we are now able to arrive at accurate evaluations of crucial reaction data for nuclear astrophysics, fusion-energy research, and other applications, using nuclear effective interactions only constrained by $A=3$ nucleon systems. I will present in this talk the No-Core Shell Model with Continuum formalism, which combines square-integrable A -nucleon eigenstates and continuous $(A - a; a)$ cluster states. This method can accurately describe reaction systems of more than four nucleons starting from two- and three-nucleon interactions. I will briefly review the physics cases recently unraveled by the method such as impact of three-nucleon forces. I will elaborate further on how combined together ab initio theory and experiments with exotic nuclei can discriminate between different flavors of chiral interaction. Encouraged by these recent applications that validate our approach, we aim at modeling $t(d; n)^4\text{He}$ fusion from an ab initio point of view. It was suggested more than 40 years ago that polarized fusion might pave the way to achieve earth-based fusion. I will present our first results towards accurate predictions for polarized fusion reaction observables.

Salle des Séminaires du CENBG

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